WE CLAIM:

1. An assay system for simulating cardiac arrhythmias, comprising:

   a monolayer, co-culture of cardiac myocytes and skeletal muscle myoblasts (SkMM); and

   a means for measuring electrical coupling of cells.

2. The assay system of claim 1 wherein the means comprises a voltage-sensitive dye.

3. The assay system of claim 1 wherein the means comprises voltage –sensitive dye di-4-ANEPPS.

4. The assay system of claim 1 wherein the means comprises fluorescent calcium imaging agent Indo-1, acetoxymethyl ester (indo-1-AM).

5. The assay system of claim 1 wherein the means is a calcium ion indicator.

6. The assay system of claim 1 wherein the means is a patch clamp apparatus.

7. The assay system of claim 1 wherein the means measures conduction velocity.

8. The assay system of claim 1 wherein the means measures action potential duration.

9. The assay system of claim 5 wherein the means is calcium ion indicator Rhod-2-AM.

10. The assay system of claim 1 further comprising an electrode.

11. The assay system of claim 1 wherein the cardiac myocytes are neonatal myocytes.

12. The assay system of claim 1 wherein the cardiac myocytes are neonatal rat myocytes (NRCM).

13. The assay system of claim 1 wherein the cardiac myocytes are ventricular myocytes.

14. The assay system of claim 1 wherein the cardiac myocytes are neonatal ventricular myocytes.

15. The assay system of claim 1 wherein the cardiac myocytes are neonatal rat ventricular myocytes (NRVM).

16. A method of assaying arrhythmias in cardiac cells *in vitro*, comprising:

   measuring an electrical property of a monolayer, co-culture of cardiac myocytes and skeletal muscle myoblasts (SkMM).

17. The method of claim 16 wherein the step of measuring employs a voltage-sensitive dye.

18. The method of claim 16 wherein the step of measuring employs voltage-sensitive dye di-4-ANEPPS.
19. The method of claim 16 wherein the step of measuring employs fluorescent calcium imaging agent Indo-1, acetoxymethyl ester (indo-1-AM).
20. The method of claim 16 wherein the step of measuring employs a calcium ion indicator.
21. The method of claim 16 wherein the step of measuring employs a patch clamp apparatus.
22. The method of claim 16 wherein the step of measuring determines conduction velocity.
23. The method of claim 16 wherein the step of measuring determines action potential duration.
24. The method of claim 16 wherein the step of measuring employs calcium ion indicator Rhod-2-AM.
25. The method of claim 16 wherein the step of measuring employs an electrode.
26. The method of claim 16 wherein the cardiac myocytes are neonatal myocytes.
27. The method of claim 16 wherein the cardiac myocytes are neonatal rat myocytes (NRCM).
28. The method of claim 16 wherein the cardiac myocytes are ventricular myocytes.
29. The method of claim 16 wherein the cardiac myocytes are neonatal ventricular myocytes.
30. The method of claim 16 wherein the cardiac myocytes are neonatal rat ventricular myocytes (NRVM).
31. A method of treating myoblasts, comprising:

    administering to the myoblasts a lentivirus encoding a connexin, whereby the connexin is expressed in the myoblasts.
32. The method of claim 31 wherein the connexin is connexin 43.
33. The method of claim 31 wherein the connexin is connexin 40.
34. The method of claim 31 further comprising the step of transplanting the treated myoblasts into a recipient host mammal.
35. The method of claim 31 further comprising the step of transplanting the treated myoblasts into a recipient host mammal's heart.
36. The method of claim 31 further comprising the step of transplanting the treated myoblasts into a recipient host mammal's brain.

37. The method of claim 31 further comprising the step of transplanting the treated myoblasts into a recipient host mammal's muscle.
38. The method of claim 31 further comprising the step of transplanting the treated myoblasts into a recipient host mammal's uterus.
39. The method of claim 31 wherein the myoblasts are skeletal muscle myoblasts.
40. The method of claim 31 wherein the myoblasts are cardiac muscle myoblasts.
41. The method of claim 31 wherein the myoblasts are uterine muscle myoblasts.
42. The method of claim 34 wherein the myoblasts are autologous to the recipient host mammal.
43. A method of treating myoblasts, comprising:

    administering to the myoblasts a nucleic acid encoding a connexin, whereby the connexin is expressed in the myoblasts; and

    transplanting the myoblasts into an organ of a recipient host mammal which is responsive to electrical stimulation.
44. The method of claim 43 wherein the connexin is connexin 43.
45. The method of claim 43 wherein the connexin is connexin 40.
46. The method of claim 43 wherein the nucleic acid is a stable vector.
47. The method of claim 43 wherein the myoblasts are stably transfected by the nucleic acid.
48. The method of claim 43 wherein the nucleic acid is a lentivirus vector.
49. The method of claim 43 wherein the organ is a heart.
50. The method of claim 43 wherein the organ is a brain.
51. The method of claim 43 wherein the organ is a muscle.
52. The method of claim 43 wherein the organ is a uterus.
53. The method of claim 43 wherein the myoblasts are skeletal muscle myoblasts.
54. The method of claim 43 wherein the myoblasts are cardiac muscle myoblasts.
55. The method of claim 43 wherein the myoblasts are uterine muscle myoblasts.
56. The method of claim 43 wherein the myoblasts are autologous to the recipient host mammal.
57. A method of treating myoblasts, comprising:

administering to the myoblasts a nucleic acid encoding a calcium channel subunit, whereby the calcium channel subunit is expressed in the myoblasts; and transplanting the myoblasts into an organ of a recipient host mammal which is responsive to electrical stimulation.

58. The method of claim 43 wherein the calcium channel subunit is an alpha subunit.

59. The method of claim 43 wherein the calcium channel subunit is a beta subunit.

60. The method of claim 43 wherein the nucleic acid is a stable vector.

61. The method of claim 43 wherein the myoblasts are stably transfected by the nucleic acid.

62. The method of claim 43 wherein the nucleic acid is a lentivirus vector.

63. The method of claim 43 wherein the organ is a heart.

64. The method of claim 43 wherein the organ is a brain.

65. The method of claim 43 wherein the organ is a muscle.

66. The method of claim 43 wherein the organ is a uterus.

67. The method of claim 43 wherein the myoblasts are skeletal muscle myoblasts.

68. The method of claim 43 wherein the myoblasts are cardiac muscle myoblasts.

69. The method of claim 43 wherein the myoblasts are uterine muscle myoblasts.

70. The method of claim 43 wherein the myoblasts are autologous to the recipient host mammal.

71. A method of treating myoblasts, comprising:

administering to the myoblasts a nucleic acid encoding a short hairpin silencing RNA (siRNA) for a potassium channel, wherein the short hairpin silencing RNA comprises two complementary sequences of 19-21 nucleotides separated by a 5-7 nucleotide spacer region which forms a loop between the two complementary sequences, whereby the short hairpin RNA is expressed in the myoblasts; and

transplanting the myoblasts into an organ of a recipient host mammal which is responsive to electrical stimulation.

72. The method of claim 43 wherein the potassium channel is voltage-gated channel.

73. The method of claim 43 wherein the potassium channel is cardiac potassium channel.

74. The method of claim 43 wherein the nucleic acid is a stable vector.

75. The method of claim 43 wherein the myoblasts are stably transfected by the nucleic acid.
76. The method of claim 43 wherein the nucleic acid is a lentivirus vector.
77. The method of claim 43 wherein the organ is a heart.
78. The method of claim 43 wherein the organ is a brain.
79. The method of claim 43 wherein the organ is a muscle.
80. The method of claim 43 wherein the organ is a uterus.
81. The method of claim 43 wherein the myoblasts are skeletal muscle myoblasts.
82. The method of claim 43 wherein the myoblasts are cardiac muscle myoblasts.
83. The method of claim 43 wherein the myoblasts are uterine muscle myoblasts.
84. The method of claim 43 wherein the myoblasts are autologous to the recipient host mammal.
85. A method of treating cells for use in cell transplantation, comprising:

administering to the cells a lentivirus encoding a connexin, whereby the connexin is expressed in the cells.

86. The method of claim 85 wherein the cells are selected from the group consisting of fibroblasts, mesenchymal stem cells, and cardiac stem cells.
87. The method of claim 85 wherein the connexin is connexin 43.
88. The method of claim 85 wherein the connexin is connexin 40.
89. The method of claim 85 further comprising the step of transplanting the treated cells into a recipient host mammal.
90. The method of claim 85 further comprising the step of transplanting the treated cells into a recipient host mammal's heart.
91. The method of claim 85 further comprising the step of transplanting the treated cells into a recipient host mammal's brain.
92. The method of claim 85 further comprising the step of transplanting the treated cells into a recipient host mammal's muscle.
93. The method of claim 85 further comprising the step of transplanting the treated cells into a recipient host mammal's uterus.
94. The method of claim 85 wherein the cells are fibroblasts.
95. The method of claim 85 wherein the cells are mesenchymal stem cells.

96. The method of claim 85 wherein the cells are cardiac stem cells.

97. The method of claim 89 wherein the myoblasts are autologous to the recipient host mammal.